

FIG. 1A

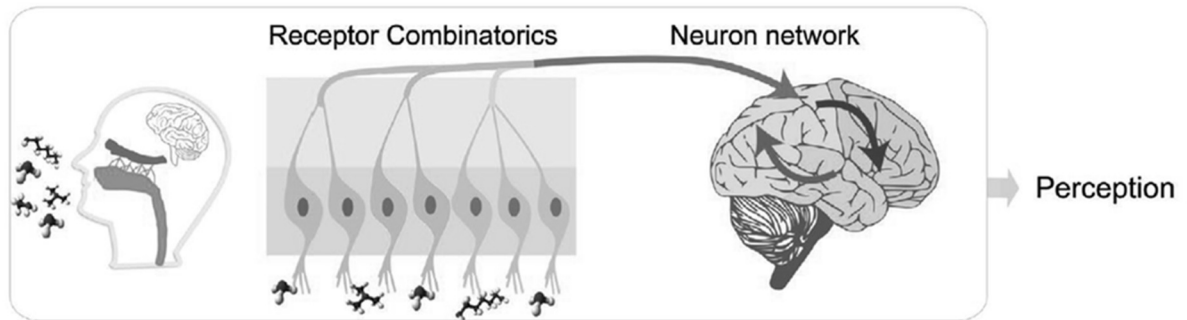


FIG. 1B

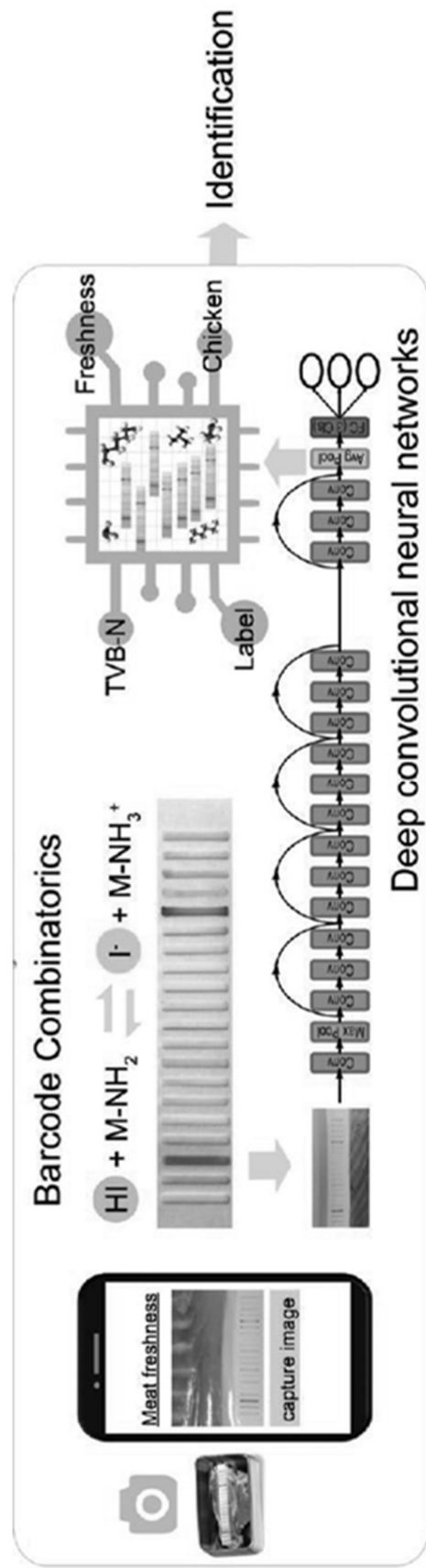


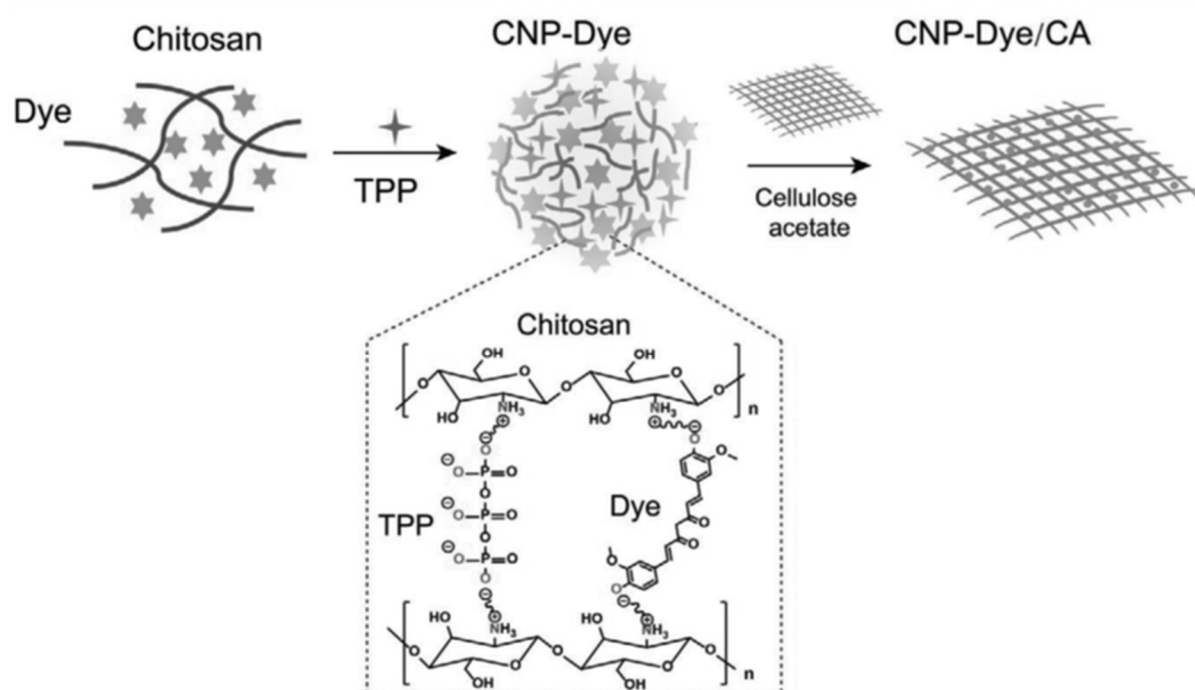
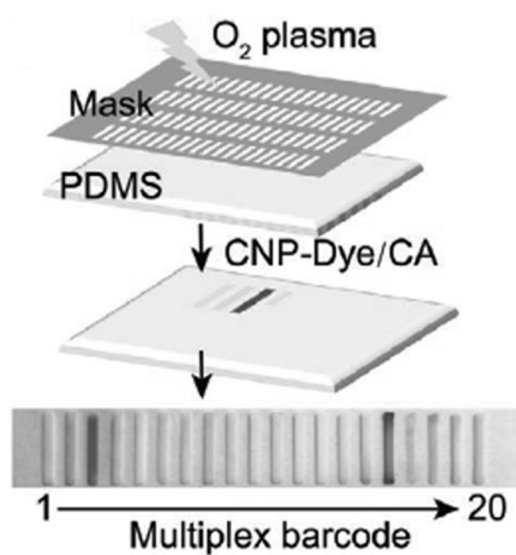
FIG. 2A**FIG. 2B**

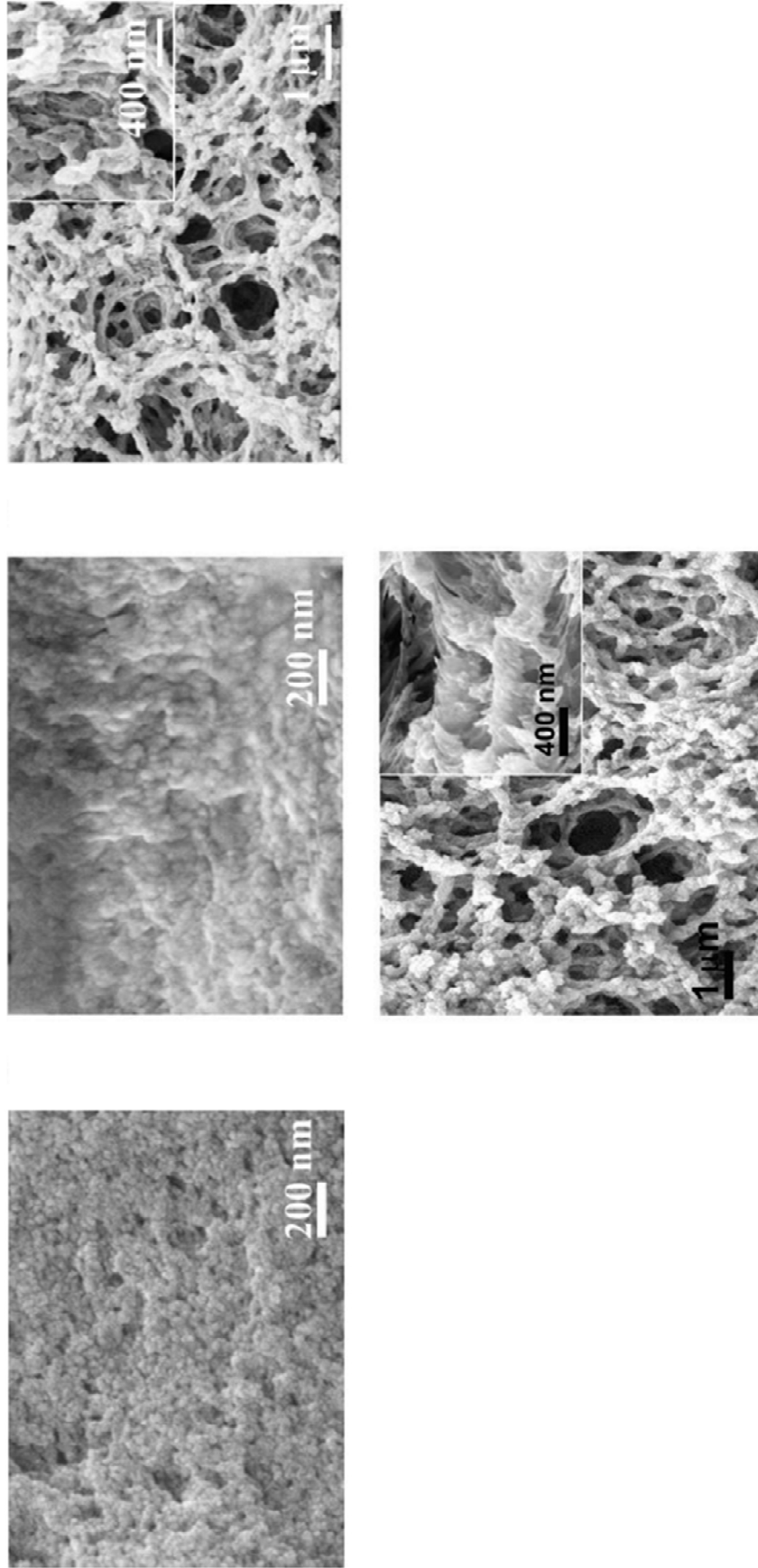
FIG. 2C

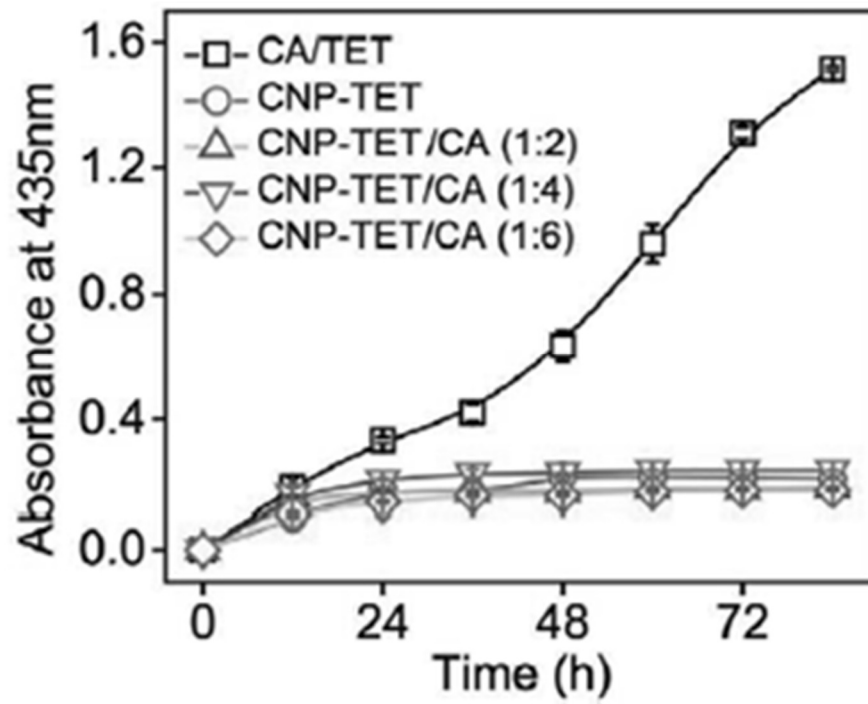
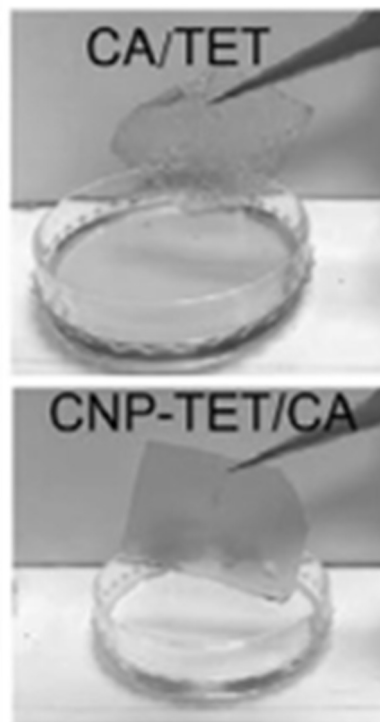
FIG. 2D**FIG. 2E**

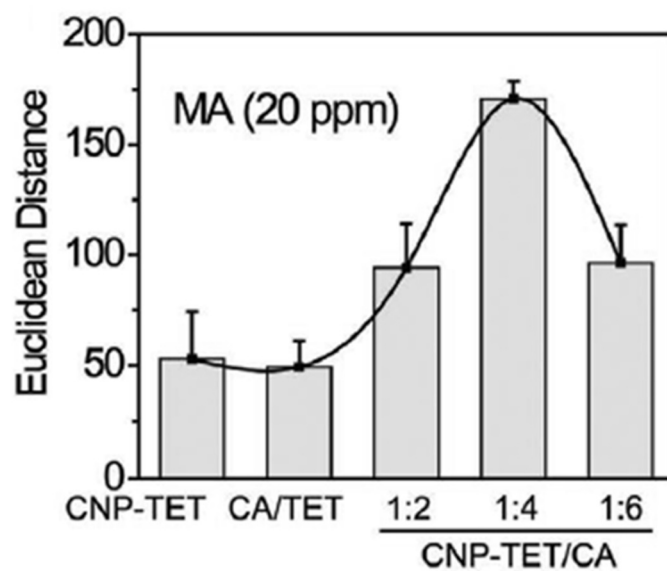
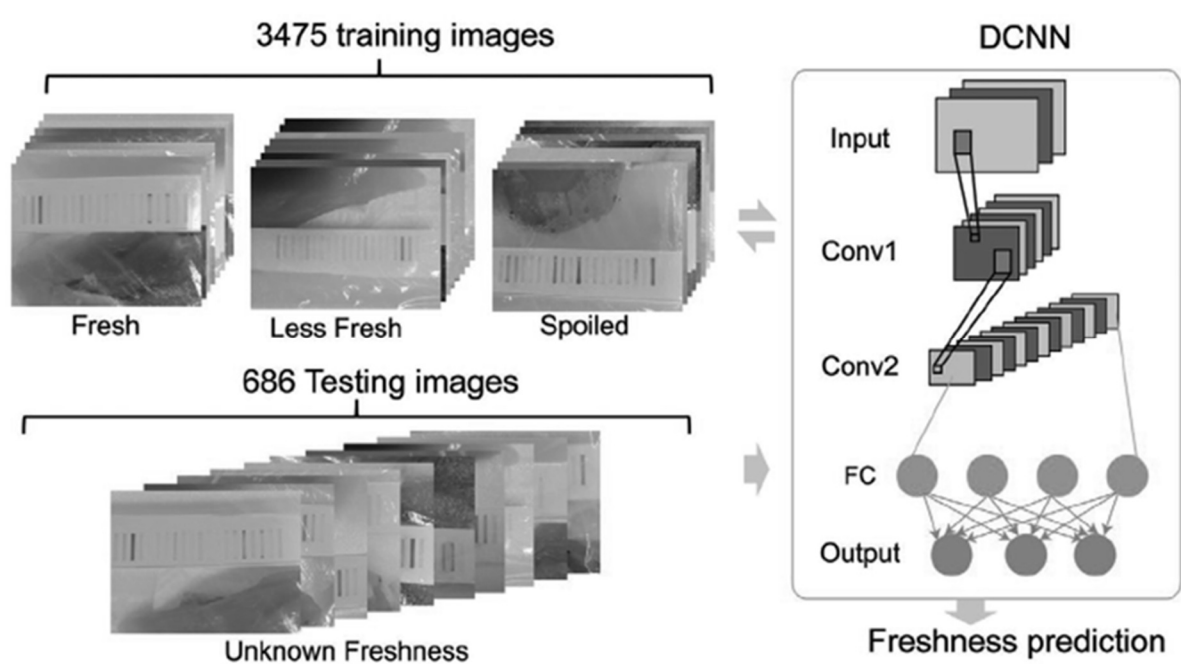
FIG. 2F**FIG. 3A**

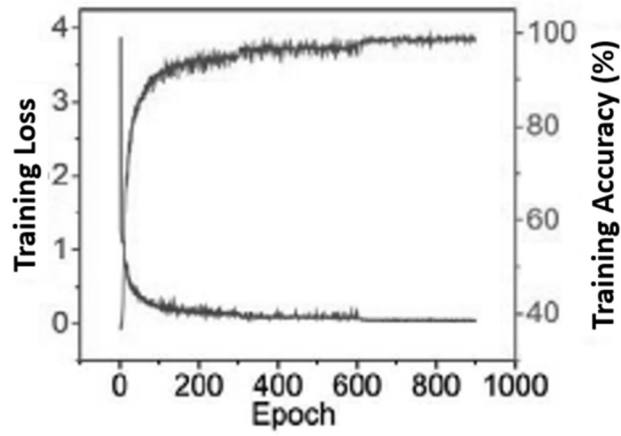
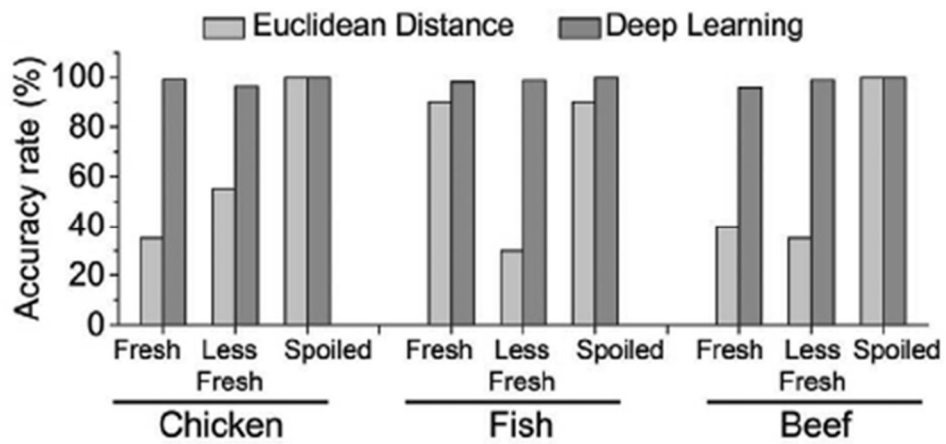
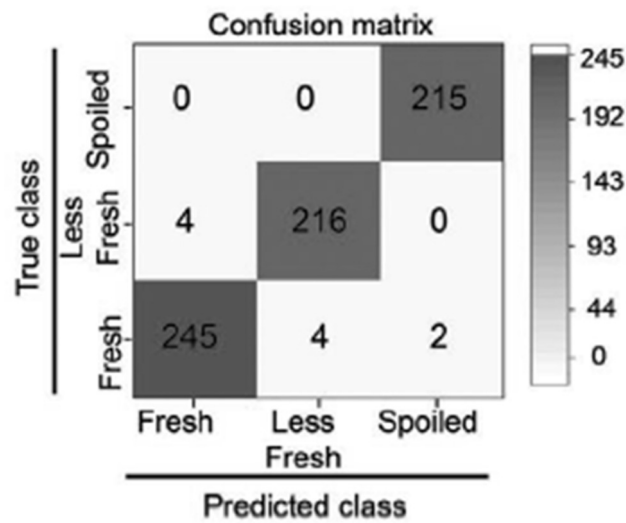
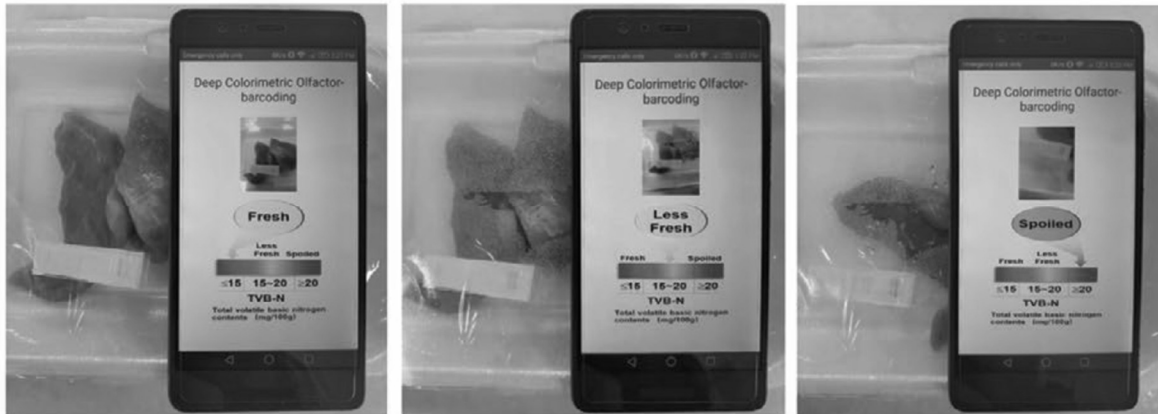
FIG. 3B**FIG. 3C****FIG. 3D**

FIG. 3E**FIG. 3F**

Transparent polyvinylchloride film

Colorimetric barcode

PTFE filter membrane

Plastic box

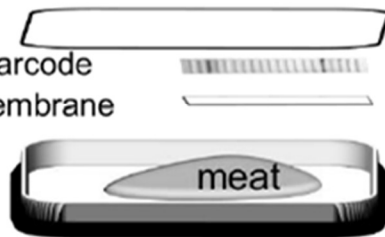


FIG. 4A

No	Name	Color Range
1	Bromothymol Blue	6.0 (Yellow) - 7.5 (Blue)
2	Bromocresol Green	3.8 (Yellow) - 5.4 (Blue)
3	Methyl Red	4.4 (Red)- 6.2 (Yellow)
4	Curcumin	7.8 (Yellow)- 9.2 (Reddish Brown)
5	alpha-Naphtholphthalein	7.1 (Brown)- 8.3 (Blue Green)
6	Nitrazine Yellow	6.0 (Yellow)- 7.2 (Blue)
7	Nile Blue	10.1 (Blue) - 11.1 (Red)
8	Bromocresol Purple	5.2 (yellow) - 6.8 (Purple)
9	Alizarin Red S	4.3 (yellow) - 6.3 (Violet)
10	Alizarin	5.5 (Yellow) - 6.8 (Red)
11	Chlorophenol Red	4.8 (Yellow) - 6.8 (Red)
12	Rosolic Acid	6.8 (Yellow) - 8.2(Red)
13	Fluorescein	4.0 (Pink) - 6.0 (Green)
14	m-Cresol Purple	7.4 (Yellow) - 9.0 (Reddish Violet)
15	Thymol Blue	8.0 (Yellow) - 9.6 (Blue)
16	Cresol Red	7.2 (Yellow) - 8.8 (Red)
17	p-Naphtholbenzein	8.2 (Yellow) - 11.0 (Green Blue)
18	Brilliant Yellow	6.4 (Yellow) - 8.0 (Reddish Orange)
19	Pyrocatechol Violet	6.0 (Yellow) -7.0 (Purple) - 9.0 (Purplish Red)
20	Tetraiodophenolsulfonephthalein (TET)	3.0 (Yellow) - 4.8 (Blue)

10/27

FIG. 4B

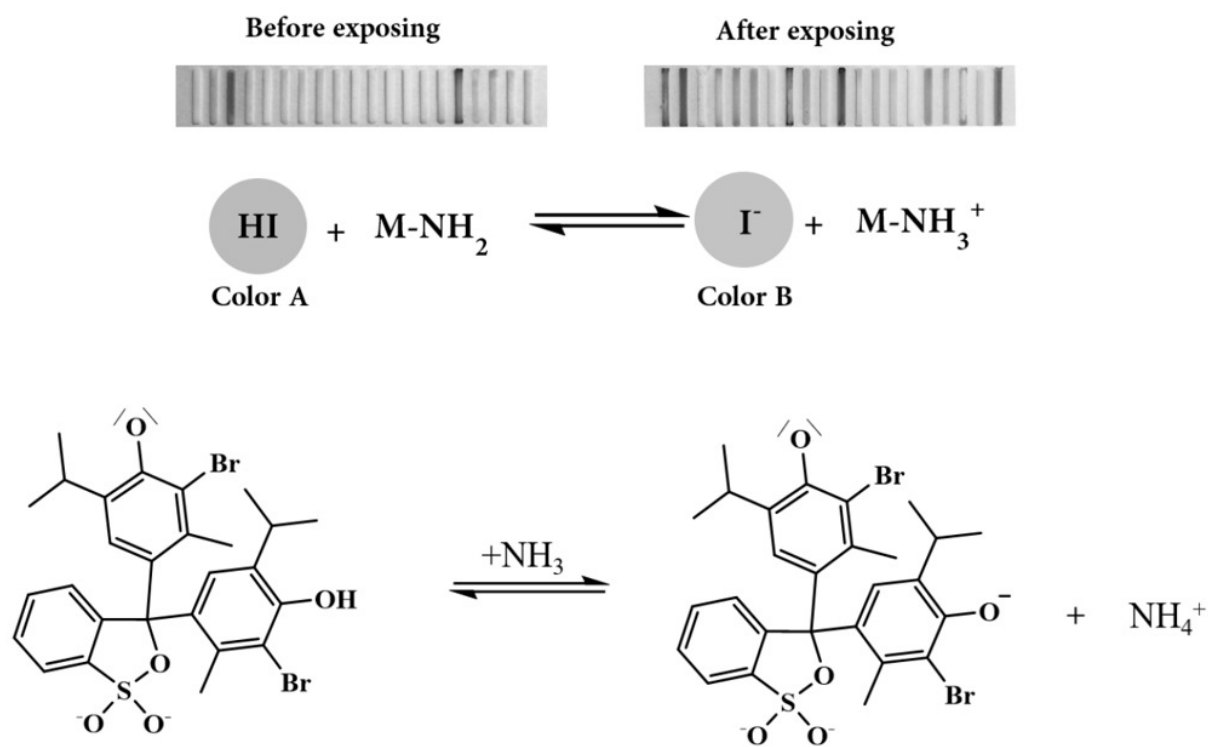
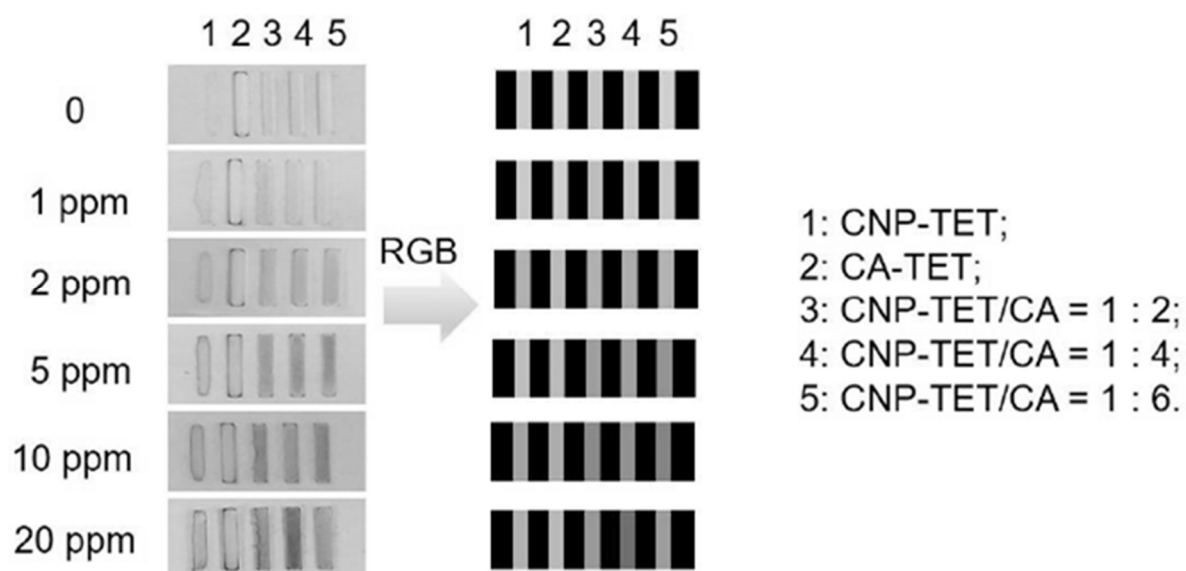
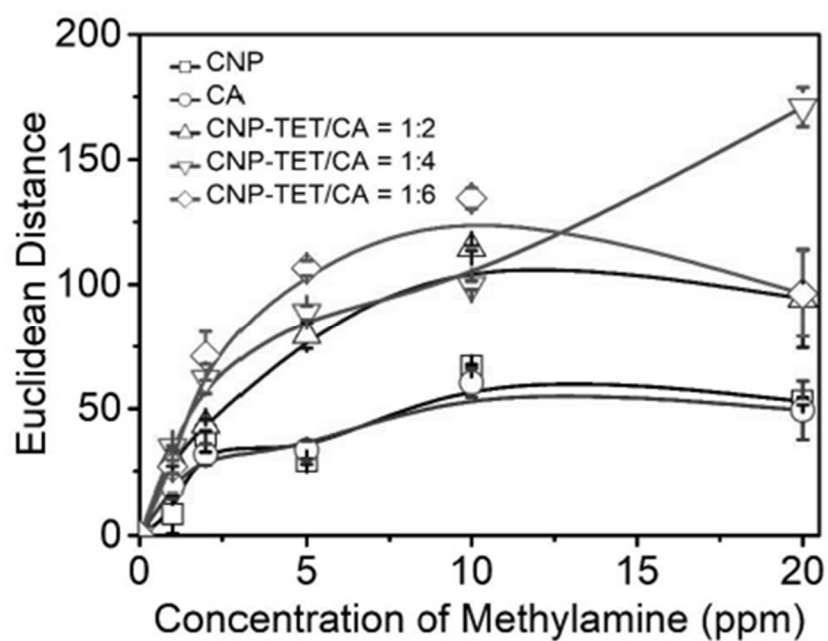


FIG. 5**FIG. 6**

12/27

FIG. 7A



FIG. 7B

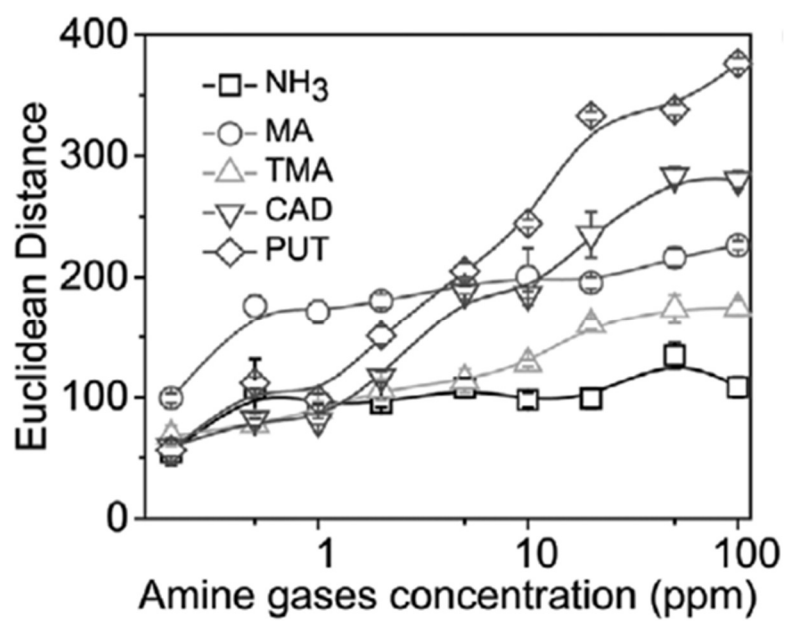


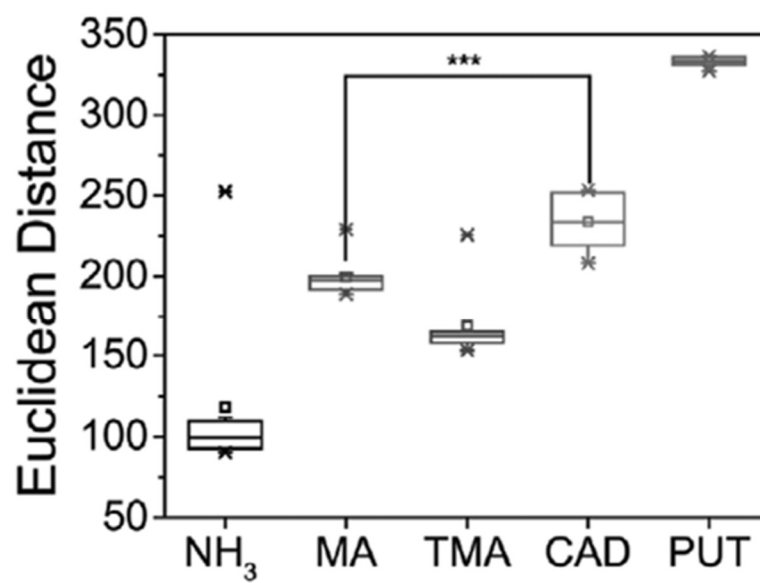
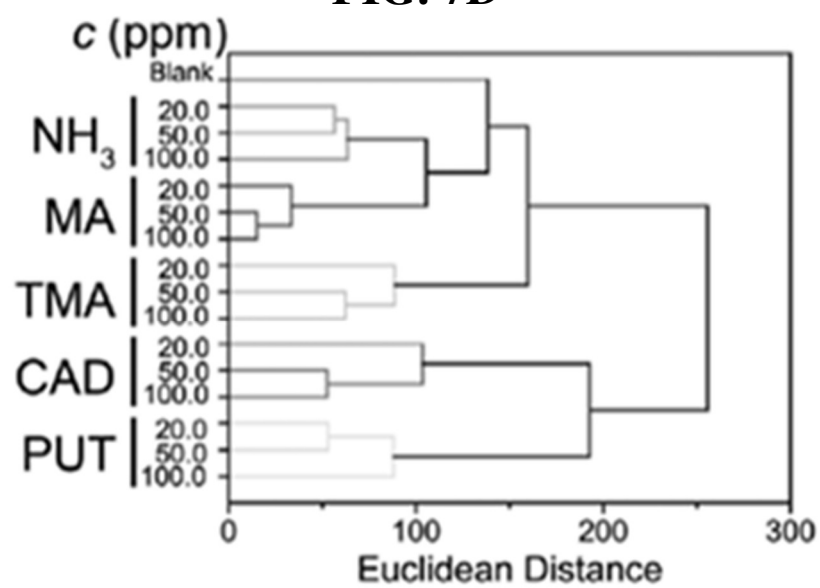
FIG. 7C**FIG. 7D**

FIG. 7E

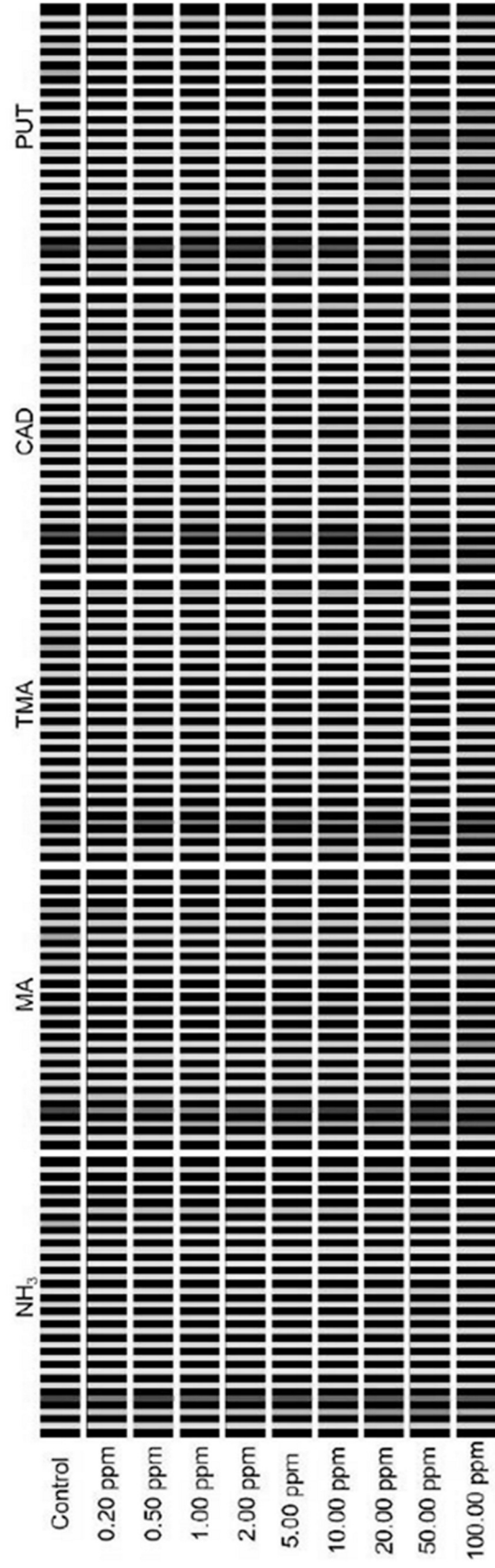


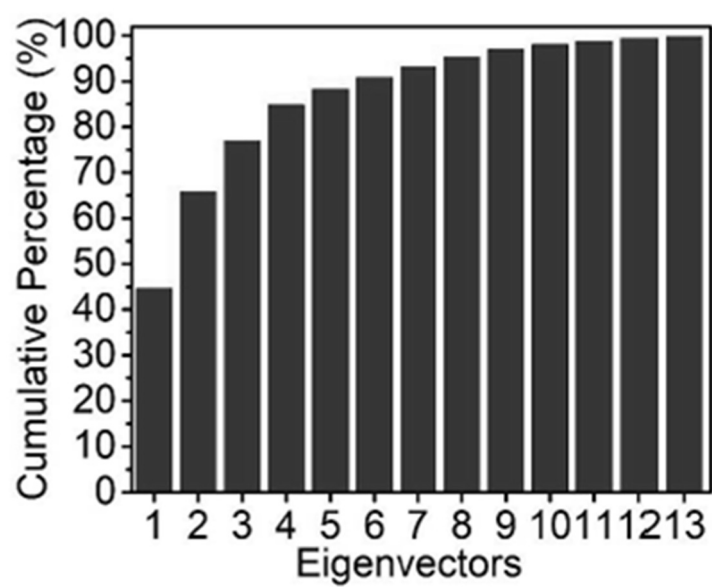
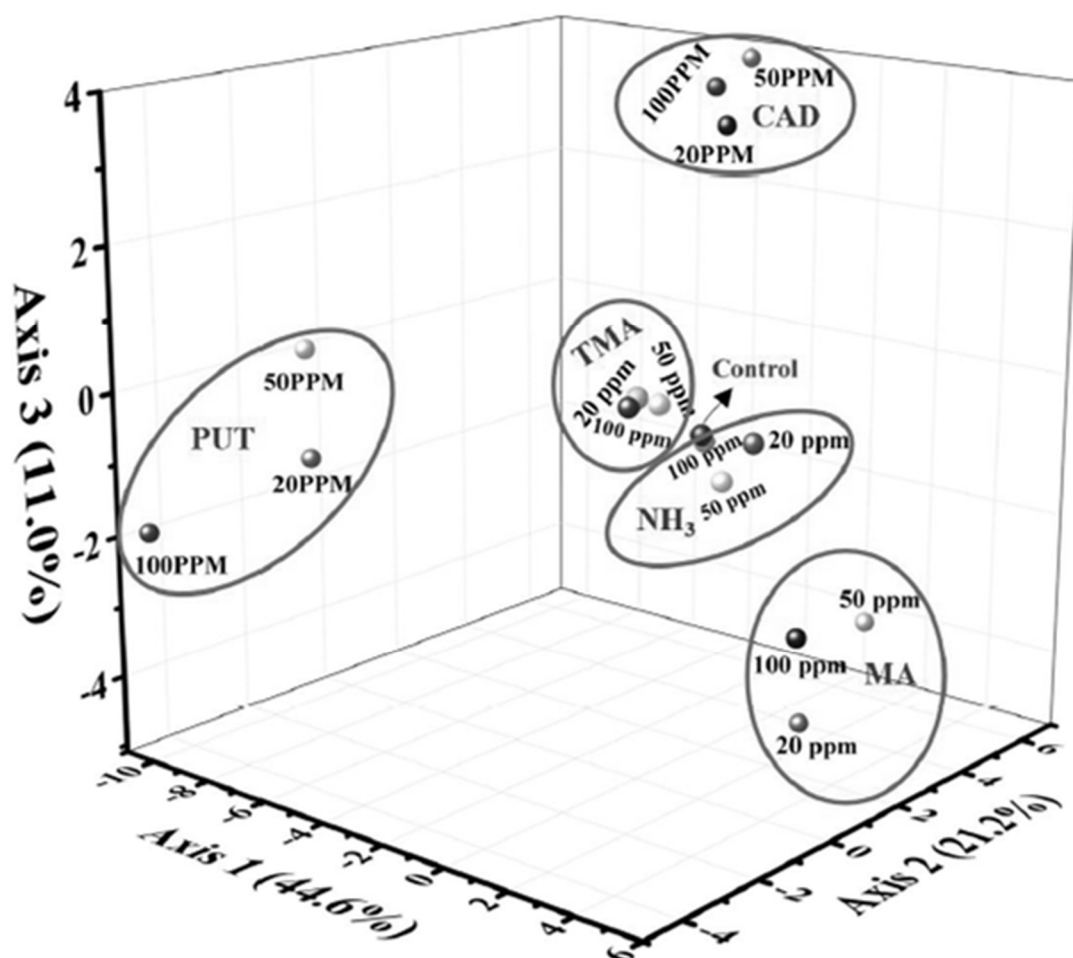
FIG. 8**FIG. 9**

FIG. 10

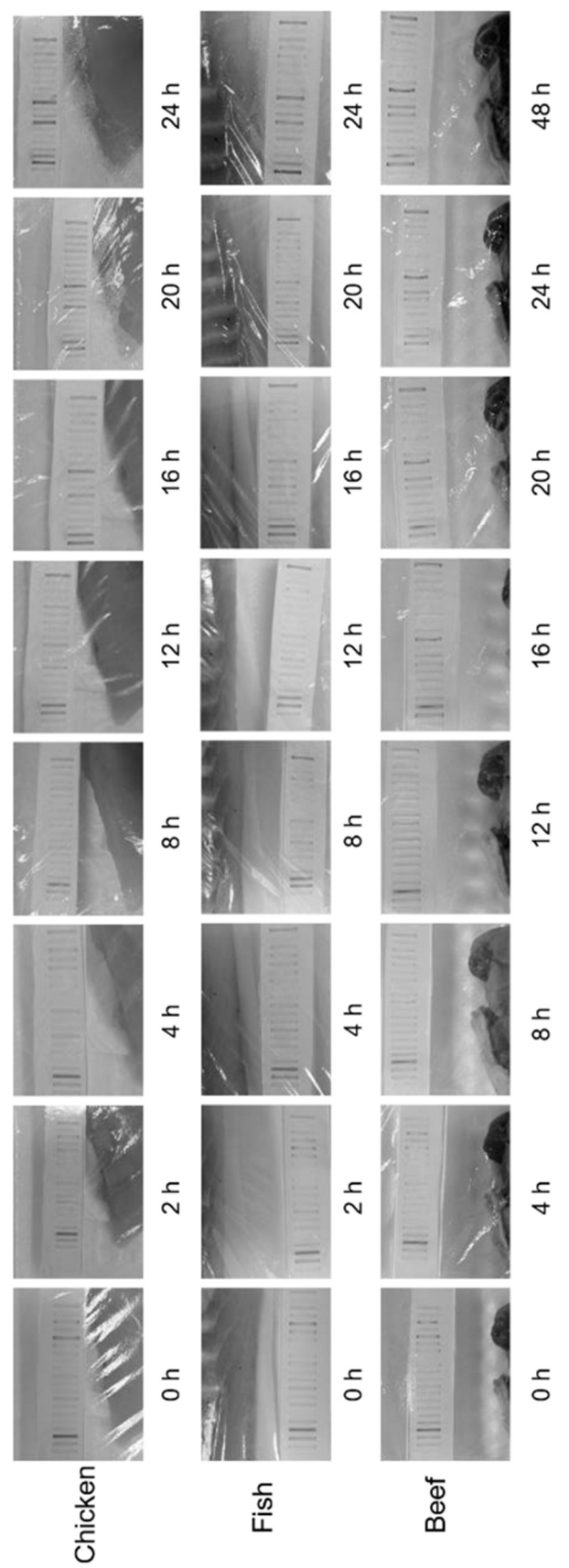


FIG. 11

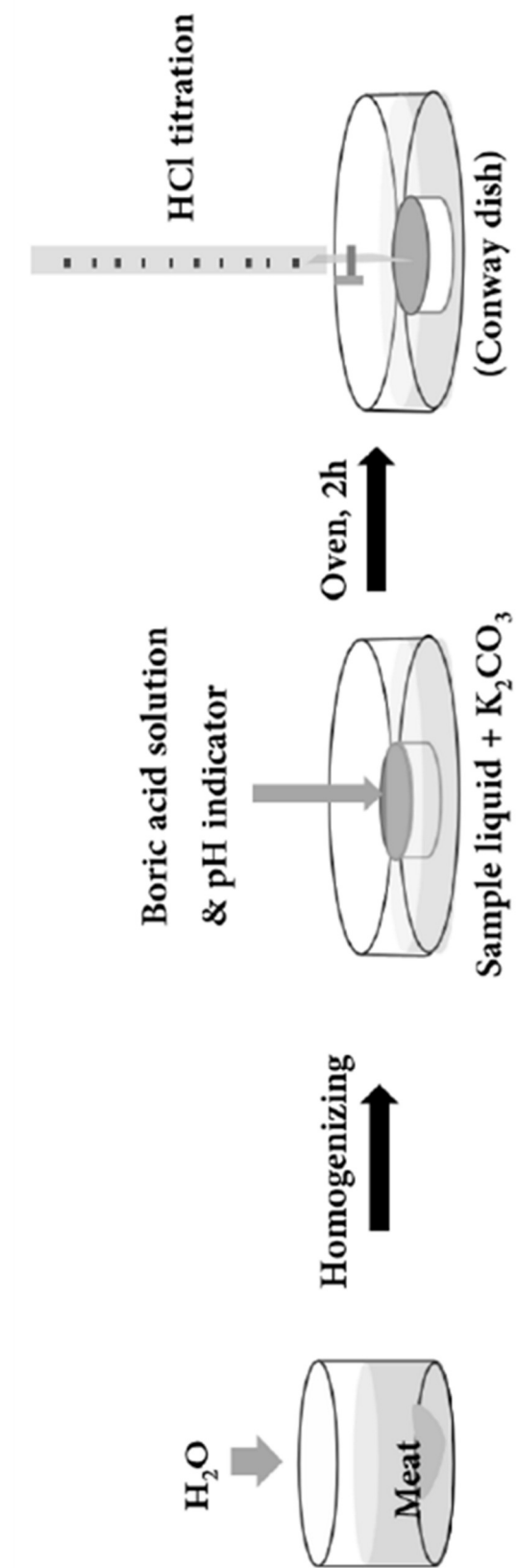


FIG. 12

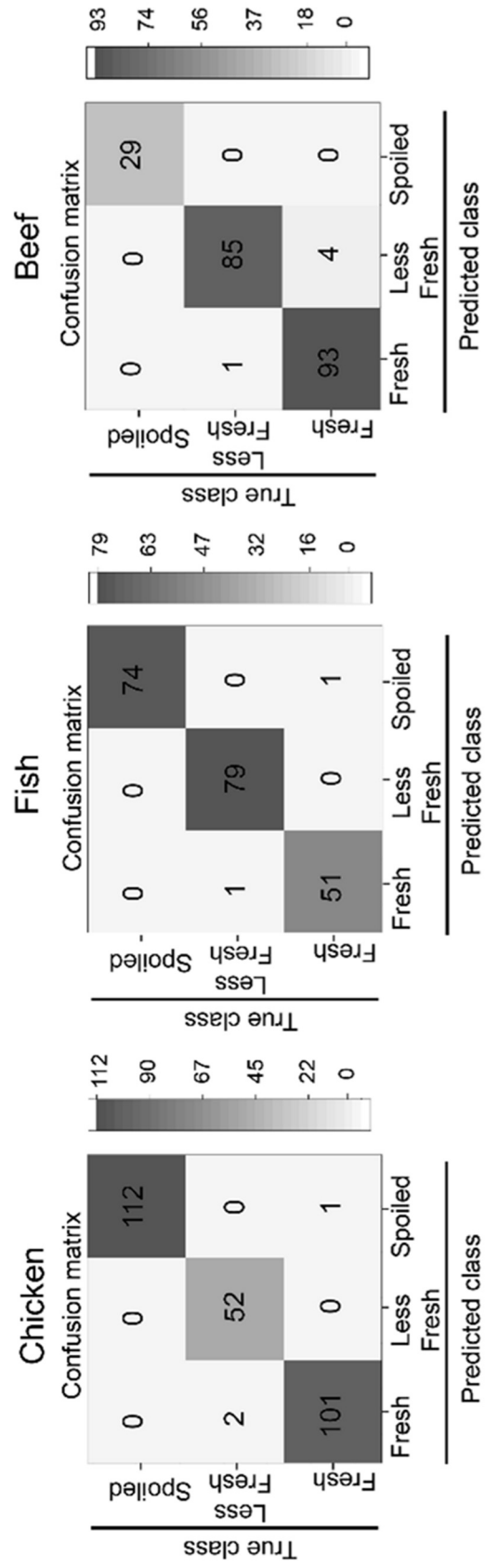


FIG. 13

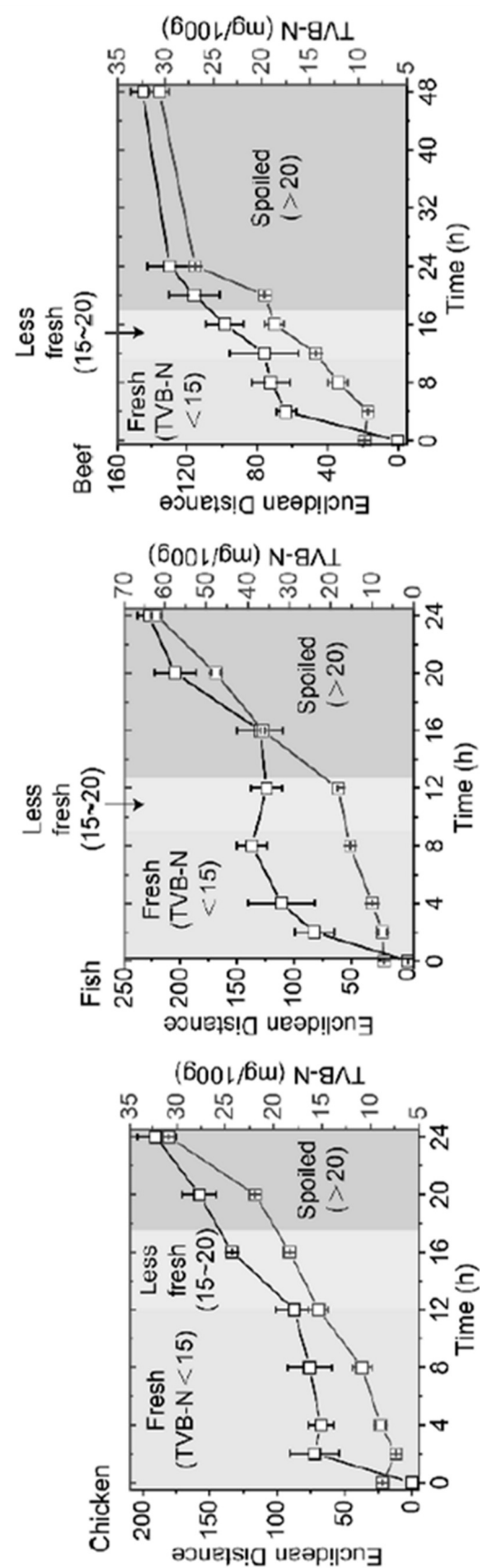


FIG. 14A

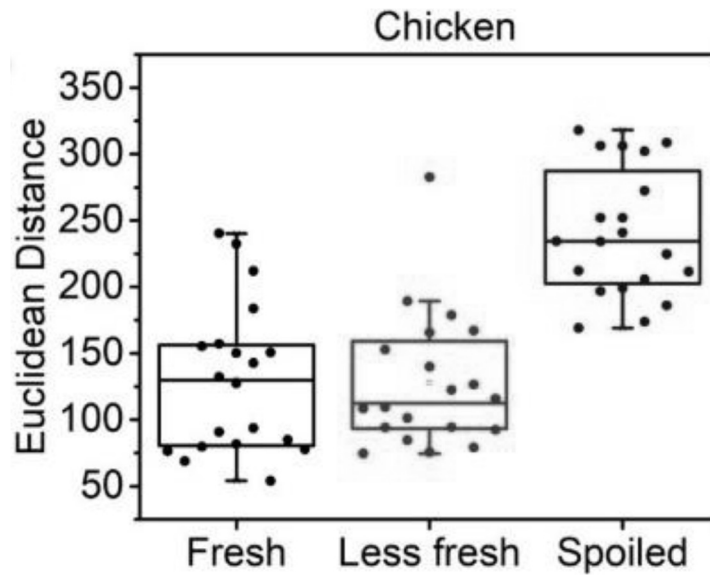


FIG. 14B

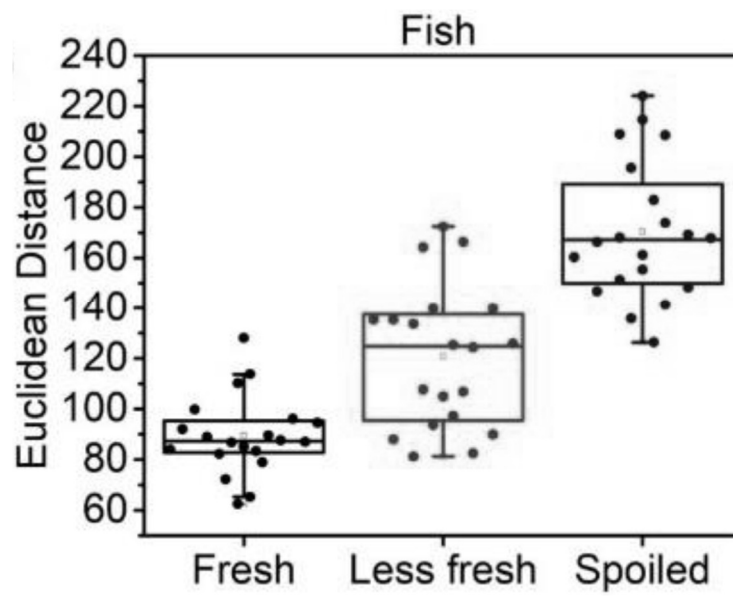


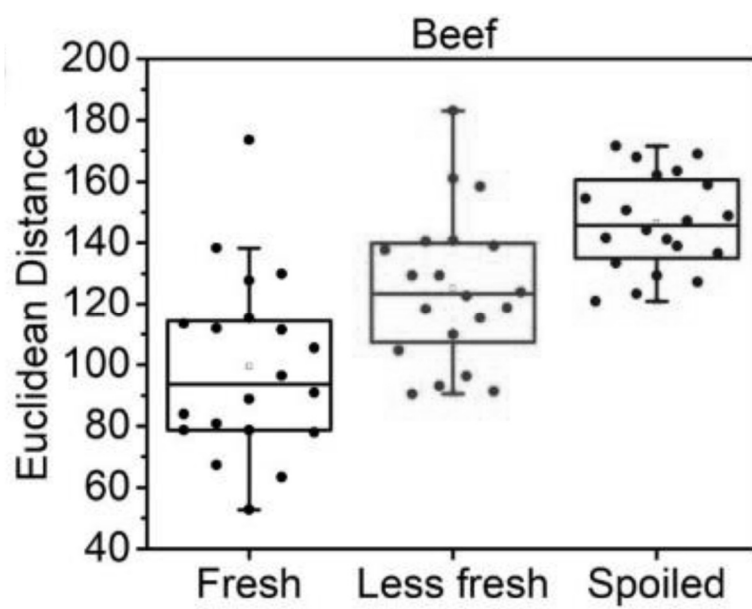
FIG. 14C

FIG. 15A



FIG. 15B

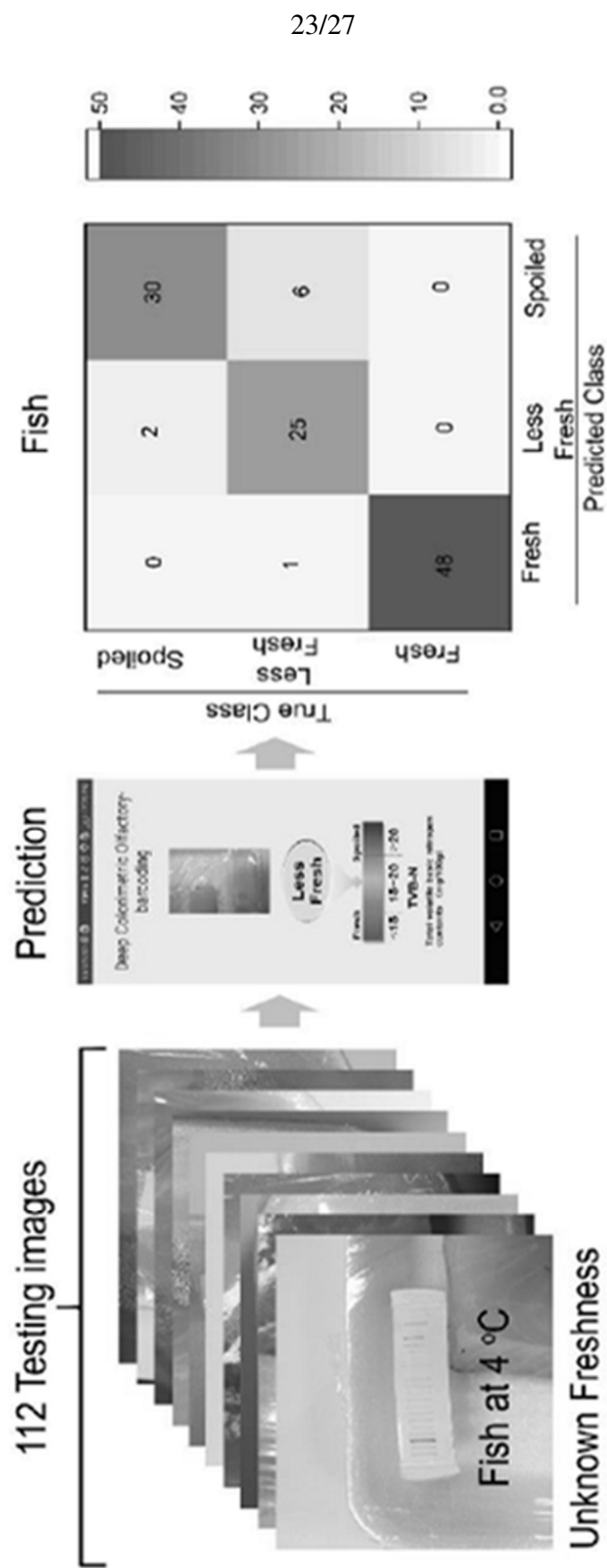


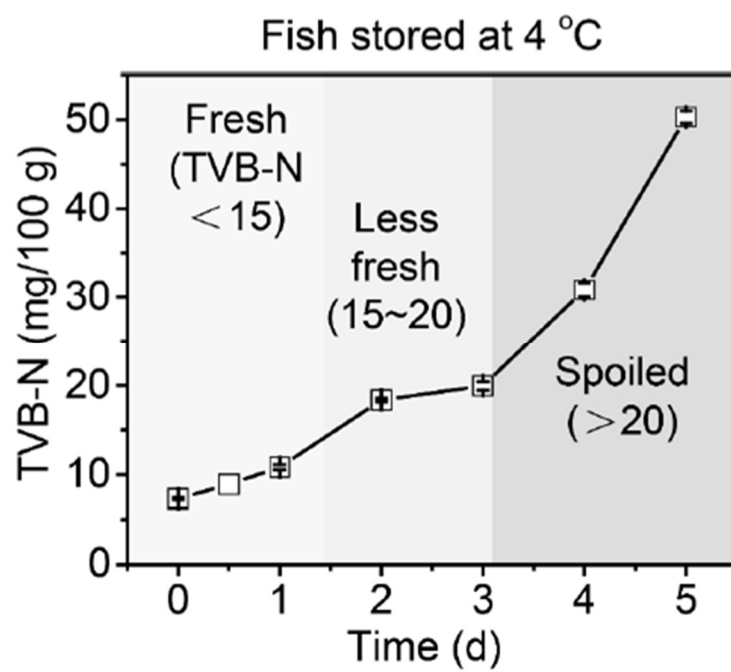
FIG. 16

FIG. 17

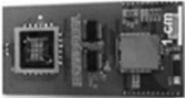
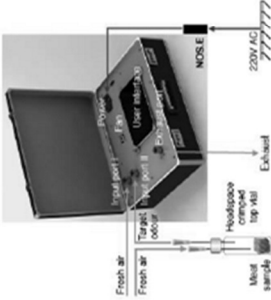
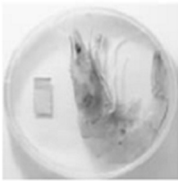
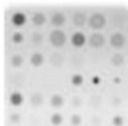
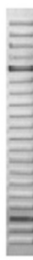
Sensing core	System integration	System size	Package compatibility	Working temperature	System response time	Classification algorithm	Accuracy in real meat testing scenario
E-nose	NFC tag		Yes	30°C	112 s for NH ₃	Linear regression	Not achieved
	A chemiresistive chemiresistive detector based on Co porphyrin/SWCNT composites	No	No	22°C and 4°C	30 s	Linear regression	Not achieved
	A 3×3 chemiresistive electronic nose		No	168°C	>1000 s for NH ₃	Principle component analysis (PCA)	Not achieved
E-nose	A commercial potable E-nose system	No	No	25°C	780 s	Partial Least Squares Regression (PLSR)	90.00%
	6 commercial metal oxide sensors		No	25 ± 1 °C	1080 s	Backpropagation neural network (BPNN); Support vector machine (SVM)	BPNN: 94% and 92.5% SVM: 67.3% and 60.5%

FIG. 17 (Continued)

4 commercial metal oxide sensors		15 cm×10 cm	No	Room temperature	295 s	PCA, K-Nearest Neighbours' algorithm (K-NN) and Partial Least Square-Discriminant Analysis (PLS-DA)	k-NN: 83.3 %; PLS-DA: 84.0%.
7 commercial metal oxide sensors		Not mentioned	No	25 °C	500 s	The hidden Markov model and segmental rapid centroid estimation	$\geq 96.32\% \pm 2.83\%$
Ormosils-based 20-element colorimetric sensor array		5.0 cm × 3.6 cm × 1.6 cm	No	24 ± 1 °C; 2 ± 1 °C;	Within 120 s	hierarchical cluster analysis (HCA), PCA, and SVM analysis based on R, G, and B values extracted	HCA: 90%; SVM: 100%.
Cellulose-based ratiometric fluorescent materials		Not mentioned	Yes	25°C; 4°C; -16°C.	Not given	According to the total volatile basic nitrogen and colony forming units	Not achieved

Opto-nose

FIG. 17 (Continued)

Present work	Nanomaterials-based 36-element colorimetric sensor array		2.5 cm×2.5 cm	No	30°C	120 s	HCA, PCA and linear discriminant analysis (LDA)	Not achieved
	Porous nanocomposites-based 20-element colorimetric barcode		0.6 cm×4.2 cm	Yes	25°C	30 s	Deep convolutional neural network	98.5%